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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



FEBRUARY 13, 1937

Where Floods Obey Man

See Page 99

A SCIENCE SERVICE PUBLICATION

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Edited by WATSON DAVIS

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DO YOU KNOW?

Angora rabbits may be sheared, but combing is said to yield a more even wool.

A California scientist is trying to find out why the wool on a sheep's shoulder is not so good as that on the hindquarter.

Although there are hundreds of varieties of rice, about two-thirds of the rice crop in the United States is of one variety.

A number of states have exhibit farms showing numerous ways in which electricity can make farm life pleasanter and more efficient.

Noise is an undesired sound, according to the recent definition of a committee on noise measurement of the American Standards Association.

A brief earthquake shock reported from Lassen Volcanic National Park, in California, was unusual in that it caused objects to rotate rather than move horizontally.

Heart disease is far more common in males than in females, in white persons than in Negroes, in Hebrews than in Gentiles, and in professional and business classes than in wage earners.

A process for making sweet potato chips has been patented for general public use.

Electricity can, and does, pass through the atmosphere when no storm-cloud is near, and even on cloudless days.

The 80-mile, All-American Canal, being constructed in southern California, will be America's biggest irrigation ditch.

Hawaii is free from malaria now, and is making strong efforts to keep the mosquitoes that carry malaria from entering the islands.

Japan broke its own world record for speedy building of oil tankers by launching a vessel in exactly one year's time from placement of the order.

To discourage natives of Togoland, West Africa, from fighting with poisoned arrows, the British government systematically destroyed the plant yielding the poison.

A new German process for showing films stereoscopically avoids the need for two pictures by use of a "fan screen," that is, two mirrors inclined to each other at an angle of 15 degrees.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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ENGINEERING

Great Model Shows Engineers How to Prepare for Floods

U. S. Waterways Experiment Station at Vicksburg
Condenses 602 Miles of Mississippi Into 1,100 Feet

See Front Cover

HIGH on the Vicksburg bluffs, overlooking the great, muddy inland sea that normally is the Mississippi River, stands the scientific laboratory that provides the nation's best information on flood control and prevention. It is the U. S. Waterways Experiment Station of the Corps of Engineers of the U. S. Army.

The Army engineers learn much, naturally, from a superflood like that which now laps at their very feet, but experiments that cost hundreds of lives and hundreds of millions of dollars in property damage are not something to be intentionally made by man. Rather, experiments at the Army Engineers' station pack 602 miles of the Mississippi River in a space only 1,100 feet long.

If the levees of the lower Mississippi River hold in the present crisis, much of the credit will go to the experiments which forecast their behavior.

By comparison with real life the model of the river seems tiny, but it is the largest structure of its kind ever used in the world. Most important of all it is accurate to a high degree, and that is what provides its greatest engineering usefulness.

Director of the Waterways Station, F. H. Falkner, First Lieut, Corps of Engineers, states that the floods of 1927, for example, have been duplicated in every detail with the model.

16,000 Square Miles

In minute attention to existing detail the model comprises the entire overflow area of the alluvial plain of the Mississippi south of Helena, Arkansas. It includes 602 miles of the main river, its five principal tributaries, all backwater areas and the entire Louisiana Sugar Bowl area of the Atchafalaya Basin, to the Gulf of Mexico. Total area represented is 16,000 square miles.

Forty-two engineers are required to work the model during tests. They attend 17 water supply lines and read 210 gages. When a flood year is reenacted the flood is duplicated on a daily time schedule that follows the risings and

lowerings of the real flood. Daily changes are made in the discharge of each stream shown in the area, and the river gages are read daily. The form, height and time of travel of the flood waves are recorded, and the routing of the flood waters through the intricate system of channels and reservoirs is carefully checked.

Four projects have been studied by Army Engineers during the last year on the Mississippi model. First was a study on the efficiency of the various cut-offs dredged through bends in the river. Notoriously meandering in some portions of its course, the Mississippi is gradually having its back straightened in places by these cut-off channels dredged by the Engineer Corps craft. By simple changes in the model, a be-

fore and after picture of these dredging operations can quickly be obtained. Moreover, as an extension of this type of experimentation, the engineers can dig cut-offs in their model and see where they should reasonably be applied in actual practice.

Flood routing through the great Atchafalaya Basin using various types of diversion outlets has been another study project during the past year. This whole great area on the west side of the river south of the Red River is the natural overflow valley of the Mississippi as it seeks the shortest path to the Gulf of Mexico.

Flood protection is provided to New Orleans by this floodway path for high water.

In the current flood, which has yet not reached this district, there is almost a certainty that the region will again be flooded as it was in 1927. While the findings of the Vicksburg Experiment Station can hardly yet have been put into practice, the results, one may be sure, will be applied in the future.

Even now, until taken from their experiments by the current emergency, the Vicksburg engineers were studying the extent and sequence of construction work that would have been required



STRONGHOLD OF FLOOD FIGHTERS

U. S. Army Air Corps photographer took this picture of the 245-acre Vicksburg, Miss., reservation where the Corps of Engineers Waterways Experiment Station is located. Army engineers here build giant models of rivers and harbors and test out proposed construction. Twisting bends of winding rivers can be seen. Pride of the station is the giant model of the Mississippi, shown at the top center of the picture.

to have handled the 1927 flood and also the project superflood which has been "par" for the Mississippi flood control work of recent years.

If the present flood brings water levels to heights anticipated from the advance Ohio River disaster forecasts, the Army Engineers may have to set a new high water level for their theoretical superflood. In any event they will have new flood data to study in their

miniature of the Father of Waters.

Out of the current disaster will probably come widespread work on soil erosion, reforestation and other stages of flood control, but wherever a new dike or levee or a constructional change in the river is contemplated, the Waterways laboratory will provide the first hurdle, proving whether it is really useful or not.

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RADIO

Scientific Journal of the Air Will Broadcast Cosmic Data

Information About Sunspots, Radiation, Magnetism, To Be Sent Out Daily From Station W1XAL, Boston

A NEW scientific journal, one that is issued by radio rather than with paper and ink, was inaugurated at Boston on Feb. 1, when World Wide Broadcasting Foundation's short-wave station W1XAL began a regular schedule of broadcasts of cosmic data and scientific news. W1XAL in this activity cooperates with the Union Radio Scientifique International, familiarly known in scientific circles by its initials URSI, and Science Service. Each afternoon W1XAL will announce in plain English technical data on observations of sunspots, solar radiation, magnetism, ionized layer heights and other phenomena that have been observed in far corners of the world during the same day.

The primary purpose of these broadcasts is to make such information available internationally and to interest scientifically inclined laymen in the making of observations.

For nearly seven years Science Service in cooperation with the American Section of the Union Radio Scientifique International has collected and distributed daily information about these fundamental inconstants of nature. The Army Radio Net has brought some of this information to Washington and the Navy has lent its valuable cooperation in the broadcasting of the daily cosmic data messages in international Morse code from NAA, Arlington, at 5:30 p.m. Eastern Standard Time on 9250 kilocycles and 4390 kilocycles.

Through arrangements effected by Walter S. Lemmon, radio engineer who is founder and president of the World Wide Broadcasting Foundation, the

facilities of educational short-wave station W1XAL are made available for the extension of the urisgram service in cooperation with Science Service. This station, licensed for international broadcasting on four frequencies, now operates on 20,000 watts and is heard with good volume in almost all parts of the world. These broadcasts of cosmic data and scientific news should, therefore, be available to listeners anywhere who

are suitably equipped with standard all wave receivers. Mr. Lemmon stated this new radio service "will aid world-wide cooperation in scientific observation and make more effective the correlation of cosmic causes and cosmic effects."

The broadcasts from W1XAL will be heard daily from 4:55 to 5:00 p.m. Eastern Standard Time on 11.79 megacycles (25.4 meters) and weekly summaries on Monday evenings from 8:30 to 8:45 p.m. EST on 6.40 megacycles (49.6 meters). The daily broadcasts will cover current data; the Monday evening broadcasts will be a weekly compilation.

The program inaugurating this new service included brief talks by Dr. A. E. Kennelly of Harvard University, the co-discoverer of the Kennelly-Heaviside layer, Dr. Harlow Shapley, director of the Harvard College Observatory and trustee of the World Wide Broadcasting Foundation, W1XAL; Dr. Loring B. Andrews, chairman of W1XAL program committee, and Watson Davis, director of Science Service.

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An elephant's heart beats about half as fast as a man's.

The meadowlark turns its back on any one approaching it, thus concealing its bright yellow breast.



BROADCAST A JOURNAL

Inaugurating the broadcast of a scientific journal of the air are (left to right) Prof. Harlow Shapley, director, Harvard College Observatory; Dr. A. E. Kennelly, Harvard, co-discoverer of the Kennelly-Heaviside radio reflecting layer of the atmosphere; and Dr. Loring B. Andrews, astronomer-chairman of the W1XAL program committee.



DR. JOHN B. WILBUR AND THE "ROBOT EINSTEIN"

MATHEMATICS

Robot Mathematician Solves Nine Simultaneous Equations

A ONE-TON machine that in a single action can solve nine simultaneous equations with nine unknowns so complicated in form they might well require days of laborious computation by trained mathematicians has been developed at the Massachusetts Institute of Technology.

Known as the simultaneous calculator, the machine is the product of three years' research by Dr. John B. Wilbur of the department of civil engineering. Cooperating with him has been Dr. Vannevar Bush, vice-president of technology and dean of engineering, who under the Institute's program to eliminate delay and complications in engineering and research, has previously made important contributions to the mechanical solution of mathematical problems, including the famous differential analyzer.

The simultaneous linear algebraic equations solved by the new machine occur constantly over a wide range of engineering and scientific analyses. Thus although the calculator was originally designed for the solution of problems in civil engineering, such as those involved in the construction of skyscrapers,

it is expected to prove equally useful in such diverse fields as nuclear physics, geodetic surveying, genetics and psychology. The mathematician will be able to use it for the evaluation of determinants especially and in several other fields, since the machine under some circumstances can solve for even more than nine unknowns.

The machine weighs approximately 2,000 pounds and has more than 13,000 separate parts, including 600 feet of flexible steel tape and almost 1000 ball-bearing pulleys. The outgrowth of an experimental model built by Dr. Wilbur two years ago, the new machine has undergone exhaustive tests and is now in active operation.

The simultaneous equations which constitute the basis of the machine's operation are mathematical expressions relating a number of unknown quantities in such a way that the value of each unknown may be determined by a simultaneous consideration of the relations involved as expressed by the equations.

In the design of a suspension bridge, for example, the stresses on each part depend on the stresses on other parts.

In addition, each of these stresses depends on the physical elastic properties of the parts themselves. Yet the value of the stresses can be calculated by solving a set of simultaneous equations which show the relations between these various stresses.

In the usual analytical solution this process involves considerable laborious manipulation of the factors. With Dr. Wilbur's new machine, however, it is necessary only to set a series of tilting plates to account for the various coefficients and constants and a single movement of the mechanism mechanically performs in a few seconds computations that might take days by ordinary methods.

Construction was made possible by a fund established by Sir Douglas Alexander of New York City.

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ASTROPHYSICS

Sunspots More Numerous; Radio Range Increases

THOSE commanding police calls on short-wave radio that strike terror into the hearts of criminals and speed officers to crime scenes are now frequently heard across the Atlantic. Two years ago they could be received only 30 to 40 miles away.

The increased number of sunspots is the cause, Dr. L. V. Berkner, Carnegie Institution of Washington physicist, explained. The activity on the sun produces its effect by increasing the density of the electrically charged layers 65, 130 and 190 miles above the earth that reflect radio waves.

When the police radio stations were first established, the high frequency (short wave) radio signals used penetrated these ionosphere layers and were lost in space. Now owing to the increased density of ions in the layers, they are reflected back to earth and their echoes are received at great distances.

Electrical conditions in the earth's outer atmosphere vary radically not only from day to night but also with the seasons, an intensive research program of the Carnegie Institution's Department of Terrestrial Magnetism has shown. Many vagaries of radio transmission and fluctuations in the earth's magnetism can be explained by changes in the ionosphere.

There are three well-defined regions of electrification that exist in the upper atmosphere, on a typical summer day at Washington about noon. In the lowest, 65 miles aloft, called the E-region,

the electrical particles or ions number about 2,800,000 per cubic inch. The F_1 region, with a height of 130 miles, has 5,300,000 per cubic inch and the F_2 region, 190 miles aloft, has 16,000,000. Ultraviolet light ionizes the two lower regions, while corpuscles from the sun

are believed to cause the high charge on the outermost layer.

During the past two years due to increased sunspots the electrical charge in the two lower layers has increased by 50 per cent and in the upper layer 200 per cent.

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AVIATION

Airline Safety Problem Holds Focus of Attention

THE WINDOW-dressing of aviation and the skeleton in the aerial family closet hold dual roles at the present time. The recent National Aviation Show in New York exhibited the new improved types of planes in the vanguard of developments in speed, safety, efficiency and performance. And in Washington the family skeleton of airplane crackups was up for an overhauling at the conference sponsored by the Bureau of Air Commerce.

At present prices few people can afford to buy airplanes, although the number of planes owned privately increases year by year. But a large number of people now ride the airlines and so have a personal stake in the crashes which in recent months have aroused public indignation.

In the present situation, therefore, the skeleton probably has more news value than the show window.

Up for discussion at the Washington conference were many things, but the highlights included:

1. The possibility that the investigation of airplane crashes be removed from the jurisdiction of the Bureau of Air Commerce. The point is that many accidents appear, either directly or indirectly, to be the fault of the so-called aids of navigation like radio beams, which are maintained by the Bureau. Thus, under the present setup the Bureau may be called upon to investigate itself. No matter how conscientiously this may be done there is bound to be, on occasions, a criticism of "white-wash." Eugene Vidal, director of the Bureau, has already pointed out this paradoxical situation and urged a change from the present arrangement.

2. A better system of blind landing. Back in 1933, the Bureau of Air Commerce had its choice of the Army system now in use and the bent beam system then under partial development by the scientists of the National Bureau of

Standards in Washington. At that time the system chosen may have been the best but whether it still stands in the favored spot today needs study. Demonstrations of the bent beam blind landing system were held during the conference. With the government economy wave of 1933, the scientists who developed this bent beam system were dropped from Federal employ but have since banded together as the Washington Institute of Technology and pushed further their development work.

3. Improved radio beacons on the airways. The known troubles of multiple courses that give false bearings to airplanes on occasion seem experimentally to be removed if the power of the beacons is decreased so that they can be heard only 50 miles instead of 100 or more as at present. The answer, therefore, seems to mean weaker stations, set closer together along the routes of the transport planes. But the necessary appropriations will require good arguments to bring them into being.

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PHYSIOLOGY

Rats Wear Out Teeth In Order to Stay Alive

WHEN a rodent's teeth do not meet and wear by contact with each other he dies by slow and involuntary suicide, according to Dr. Dewey G. Steele, professor of genetics at the Connecticut State College.

Unlike the teeth of a man those of a rodent grow through its entire life. If by some chance they do not meet each other and wear down they often grow up through the mouth and into the nasal or brain cavities. The upper teeth grow down into the lower jaw.

Extreme pain, infection and death usually result, according to Dr. Steele.

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METEOROLOGY

Dust Bowl Grows While Floods Rage

FLOOD is not a problem in some parts of the country, despite its continued dominance of newspaper front pages. In the Southwest's notorious Dust Bowl, drought shows its white fangs again, a summary report from the U.S. Weather Bureau indicates. During all of January and thus far into February, less than a quarter of normal precipitation has been received in considerable parts of the region.

Meantime, the Southeast continues to struggle with its problem of unseasonable warmth. Peach trees in Georgia are in full bloom, and Southern vegetables are far too advanced for the season. A stiff frost could work havoc throughout the Southeast—and the frostline pushed dangerously deep into Dixie recently.

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ANTHROPOLOGY

Weather Disasters Bred Wars in U. S. History

ABOUT 250 years ago, disasters of weather suffered by Plains Indians were breeding wars for United States history. This object lesson from Indian archaeology is drawn by Dr. W. R. Wedel of the Smithsonian Institution.

The warlike temper of Plains Indians, when white settlers ventured in covered wagons among them, is blamed, indirectly at least, on drought.

It appears that before the white men came a major drought had swept the Great Plains, driving Indian farmers out of their villages, and ending an era of peaceful agricultural life in the region. The "rehabilitated" Indians found themselves pushed into a greatly restricted section after the drought. In their economic worries they quarreled among themselves, fortified their villages, endured raids and massacres from their neighbors.

When white traders came, bringing horses, the situation grew worse, as many tribes became roving bison hunters or combined farming with roving. With swift horses, raiding and defensive fighting among the Indians became more frequent. When white settlers arrived, the psychology of an entire region had subtly degenerated from a state of peace to a state of war and suspicion, and the white men were received with warcries and violent resistance from hostile red men.

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GENERAL SCIENCE

Science to Find New Resources, Point Out Saner Way of Life

Dual Role in Development of Democracy Hailed By Speakers at American Institute Dinner

SCIENCE was acclaimed at the American Institute annual dinner in New York City for two future possibilities:

1. It will save civilization when natural resources run low.
2. Its methods applied to other fields will lead to effective democracy and better living.

Dr. Frank B. Jewett, president of the Bell Telephone Laboratories, accepting on behalf of its 4,500 employees the Gold Medal of the American Institute, predicted that the quest for oil and other mineral resources within the United States will soon become as futile as hunting for buffalo.

Watson Davis, director of Science Service, in receiving a fellowship of the American Institute warned that "not even science must be allowed to become a dictator" and that science must set the example for straight thinking, confident that the processes of democracy guided by scientific method and reason will give the effective result.

Exploring in New Dimension

"While we have exhausted the two-dimensional surface of the earth for geographical frontiers and while, as seems likely, we are nearing the limit of our three-dimensional exploration beneath the surface of the earth," Dr. Jewett said, "yet through discoveries in fundamental and applied science we are most opportunely becoming conscious of the vast domains of physics, chemistry and biology. These, strictly speaking, are neither on the surface of the earth nor within it. In a purely figurative way, they are what I refer to as a fourth dimension. Here, as I see it, is our hope for the future, both as individuals who must by the creative or productive work of our hands and heads earn our living, and collectively as a nation with a still increasing population and an ambition to achieve an ever higher standard of living."

"The implications of the present pooling of interests by the public and the world of science extend far beyond the mere implanting of scientific facts into the minds of laymen, or the replace-

ment of so many newspaper columns of crime, politics, or other news by scientific news," said Mr. Davis. "Science reporting and interpretation do not accomplish their purpose—the principal purpose of science popularization—if they do not bring about an appreciation and a utilization of the method of science in every-day life."

Two awards of the American Institute of the City of New York for 1937, the Gold Medal to the Bell Telephone Laboratories, and a fellowship to Watson Davis, director of Science Service, Washington, D. C., were made at the dinner attended by more than three hundred members and guests. Robert T. Pollock, president of the Institute, presided and made the awards. Other speakers were President Karl T. Compton of Massachusetts Institute of Technology, Cambridge, Mass.; G. B. Parker, editor-in-chief of the Scripps-Howard newspapers, Washington, D. C.; and J. O. Perrine, assistant editor, Bell System Technical Journal, New York.

The gold medal, given annually in recognition of outstanding accomplishment in research, went to the Bell Telephone Laboratories "for researches in electrical science which, applied to communication, have promoted understanding, security and commerce among peoples by transmitting human thought instantly throughout the world."

For Interpreting Science

The fellowship in the Institute, given for outstanding service in the interpretation of science to laymen, was conferred on Watson Davis "for interpreting to the people of the Nation the rapid progress of science upon which modern civilization depends and for the organized dissemination of research findings as news."

Reviewing the accomplishments of the Bell Telephone Laboratories, Dr. Compton cited pioneering in television, the transmission of pictures over telephone circuits, ship-to-shore and trans-oceanic telephony, the co-axial cable capable of carrying 240 separate telephone conversations over a single pair

of wires, sound recording systems and aids to the deaf.

"Many distinctly scientific achievements," he continued, "have contributed both to these practical developments and also to the progress of science generally. Among these are: a satisfactory oxide-coated filament for electron tubes, the discovery that electrons are diffracted, like waves, from crystal surfaces, great progress in knowledge of the nature of speech and analysis of sounds, the development of new electron optics, great advances in photoelectricity and especially in the production of sensitized photoelectric surfaces, discovery of remarkable magnetic materials, like permalloy, and the mathematical theory of electric circuits."

Science, Wonder-Bringer

No single move in the history of journalism was more important than the founding of Science Service, Mr. Parker said in presenting Mr. Davis for the fellowship. "Science, more than any single force, was then, as now, changing the face of the time, was bringing into the world more wonders in a decade than had been discovered in ten centuries before. It was altering the existence of every man, woman and child in this nation, and, in terms of economics, peace and war, health, happiness and employment was literally changing the life of the globe.

"Because newspapers manifestly were the quickest and most frequent means of communication of what was going on and because they reached millions where scientific magazines reached scores," Mr. Parker continued, "it should have been quite obvious that as a matter of vast public service some sort of a practical working understanding should be reached between the scientists on the one hand and the press on the other. This cooperation was achieved through the founding of Science Service.

"The first news report from Science Service was sent out by Watson Davis," Mr. Parker stated, "and since then he has supervised the day-by-day progress of the institution, which, in its sixteen years, has played such a tremendous part in bringing together science and the human beings over which science holds sway."

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Enamel on the teeth is the hardest tissue in the body.

An automobile is about an eighth of an inch longer on a hot summer day than on a cold day in winter.

GENERAL SCIENCE

European Laboratory Tour Planned by Research Council

INDUSTRIAL and banking executives from New York and all parts of the country will be taken behind the scenes of Europe's industrial and other research institutions next summer, it was announced by the National Research Council's Division of Engineering and Industrial Research.

One hundred leaders in industry and banking from all sections of the United States are expected to participate in the tour of European laboratories.

The group is scheduled to sail on May 14 from New York on the S.S. Champlain, according to present preliminary plans, and will visit outstanding scientific research laboratories of private industry representing eighteen major fields as well as the laboratories of governments, universities and trade associations.

The tour will take the American group to industries and laboratories in England, Germany and France and is being arranged by Maurice Holland, director of the National Research Council's Division of Engineering and Industrial Research.

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ANATOMY

Brain Keeps Growing But "Brains" Do Not

THE BRAIN inside your head continues to grow until the age of 50 or 60 years.

Evidence for this invisible growth, detected by measurements of great numbers of human heads, is reported by Dr. Ales Hrdlicka, noted anthropologist of the U.S. National Museum. That the human head continues to grow until old age sets in is demonstrated by Dr. Hrdlicka's own measurements of American heads. Foreign scientific studies reveal the same growth phenomenon in other peoples.

Dr. Hrdlicka has concluded the most logical cause for this head growth is that the brain itself is growing, since there is no evidence that the scalp or bones of the vault thicken with age. The chance that frontal sinuses would account for the enlargement is also discounted, since Dr. Hrdlicka explains that they attain their full growth when the adult is still fairly young.

Continued slight growth of the brain does not serve to improve intelligence

in adults, so far as is known. That is, the new idea of a growing adult brain does not, so far, alter psychological views, that only in exceptional individuals does absolute intelligence increase after about 20 years.

Dr. Hrdlicka's measurements show that each part of the body seems to have its own growth curve, harmonizing in complex patterns into the growth of the body as a whole. The nose, he has found, may continue to grow longer and broader well into the sixth decade of life, and the ears may continue to grow even after an individual is 80 years old. The mouth is still growing after 60 years.

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TECHNOLOGY

Making Bricks With Straw Found to Be Good Science

WHEN the old Pharaoh of Egypt in the Bible's chapter of Exodus denied the Hebrews further straw with which to make brick, he may have been faced with a shortage of straw or really wanted to keep them busy as reported. But on top of that, whether he knew it or not, he was throwing out a sound scientific phenomenon which straw's properties had brought to ancient brick-making through previous ages.

Experiments conducted by Charles R. Oberfell, chemist for a paper firm in Lynchburg, Va., and Prof. John W. Whittemore of the Virginia Polytechnic Institute, Blacksburg, have developed a material containing tannin extract—a constituent of straw—for the manufacture of bricks.

It was this material, and not the binding qualities of straw, that made the Egyptian process worthwhile, the chemists assert.

Known as "plasticade," the substance has a lignin and tannin base. It is being put into use by manufacturers of brick and tile throughout the United States, the discoverers report.

Conclusions have been reached both in laboratory and plant investigations that the use of this combination of lignin and tannin has extensive economic value as an addition to clays and shales because it reduces manufacturing losses and improves the physical qualities of the finished product.

Other advantages include: reduction of losses in drying and firing, improvement in strength and resistance; decrease in shrinkage, and reduction of absorption.

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IN SCIENCE

ARCHAEOLOGY

Old Razor Blade Problem Stumped Stone Age Men

DISCOVERY that even prehistoric man didn't know what to do with old razor blades has dawned upon archaeologists.

Digging in Mesopotamia, in ruins of the world's oldest city, Tepe Gawra, Dr. E. A. Speiser of the University Museum, University of Pennsylvania, brought up a 6,000-year-old razor handle. The handle is of gray limestone, has a long slit to take the blade, and a loop for the middle finger. Dr. Speiser reports that straight razors have not improved much in 6,000 years.

"This solitary handle now lends meaning to the thousands of blades of flint and obsidian that have been turning up loose on prehistoric sites," he comments. Many are old razor blades discarded in the Late Stone Age.

Science News Letter, February 13, 1937

PHYSICS

Polarized Light Aids In Selection of Yarns

NEW methods of examining undyed yarns developed by Prof. Edward R. Schwarz of the Massachusetts Institute of Technology reveal the history of the yarn and even its age when picked. Special polarized light and the microscope are the tools of the new technique which is revolutionizing the art of selecting yarns for textiles.

Undyed yarns are nearly colorless in ordinary white light but when examined with a microscope and polarized light they exhibit various brilliant shades of color in different places. These colors are the tell-tale signs of immature fibers. In the case of cotton, particularly, "unripe" fibers are weak and must be detected quickly, states Dr. Schwarz.

Even man-made rayon is not perfect and the weak spots in rayon yarns can similarly be detected by the method. Weaving the yarn into cloth does not destroy the evidence of defects and the scientific detective method can tell not only how good the yarn is but also how well the weaving was done.

Science News Letter, February 13, 1937

NE FIELDS

TELEVISION

Japan to Spend \$1,500,000 On Television Research

RESEARCH in television in Japan is to be furthered by the expenditure of an appropriation of \$1,500,000 during the present year. The funds have been made available by the Japanese Broadcasting Corporation.

A laboratory to house the experiments of Professor Takayanagi, television expert, will be completed next month. The Japanese is reported to be 90 per cent successful in his experiments to use a daylight television receiver instead of the present fluorescent-light type. Hope of the JBC is to give television broadcasts of the 1940 Olympic games.

Science News Letter, February 13, 1937

MEDICINE

Aspirin, Generally Safe, Hard on Sensitive Persons

WHEN a person is sensitive to aspirin, he is violently sensitive to aspirin. And when he isn't, he isn't.

From the Mayo Clinic, Rochester, Minn., comes a report of hypersensitivity to this familiar and ordinarily innocuous drug, involving 62 cases.

All one of these persons needs to do is to swallow a five-grain aspirin tablet. In from ten minutes to two hours dreadful things begin to happen.

Asthma in an alarming form is the most frequent and serious type of reaction. Other people get terrible sneezing fits and their noses stop up. Some have "giant" hives and others break out into a rash. Some persons' faces swell until their eyes are closed. Others get severe cramps in the abdomen. Still others develop great purple splotches on the skin.

Women are more sensitive to the drug than men. Everyone who is upset by aspirin seems to have a personal or family history of allergy.

Those with asthma are particularly liable to be sensitive and if along with their asthma they have nasal polyps, it goes hard with them indeed. Patients such as these have been known to die following a dose of aspirin.

If an individual knows he is sensitive

to aspirin he can avoid it, and he will after one attack of any violence. But the presence of acetylsalicylic acid, its scientific name, in many "patent" medicines makes them an unsuspected source of danger.

Say Drs. Louis E. Prickman and Harold F. Buchstein of the Mayo Clinic, after describing their 62 cases (*Journal, American Medical Association*, Feb. 6): "Acetylsalicylic acid is a useful and effective drug, and it may be prescribed with relative safety to patients who give no history of personal or familial allergy. It may also be used with caution by allergic patients after ascertaining that it has been used previously by them without ill effect."

Science News Letter, February 13, 1937

CHEMISTRY

Dyes Kept From "Bleeding" By New Compounds

YOU MIGHT shudder at the odor of a stale egg; or turn up your nose at the smell of a bad fish; or choke on ammonia fumes. But the ammonia which chokes, the hydrogen sulfide gas which makes the egg smell bad, and the phosphine gas which makes the fish smell foul, are the basis of the newest test tube "babies" for the textile industry—the "onium" compounds.

Watch particularly the quaternary ammonium, phosphonium, and sulphonium chemical infants. These are complex compounds with hearts of nitrogen, phosphorus and sulphur atoms. They bring joy to the textile dyer, printer and finisher, who is responsible for the beautiful color and finish of the clothes you wear.

Does the dye in a dress "bleed"; that is, run when it is wet or contacts perspiration? Just dip it in a warm solution of cetyl pyridinium bromide, rinse and dry. Notice how fast the dyes become. Water and perspiration no more make them run.

Did the dyer put the wrong dye on the fabric, or didn't the dye go on evenly? He needn't worry. He can strip the dye completely from the fabric and dye all over again. Trimethyl cetyl ammonium bromide, another one of those new "onium" compounds, does the trick.

Other of the "onium" chemicals whose names need not worry the layman have now made it possible for the dyer to use wool dyes on cotton and synthetic silks. This is helpful, for the wool dyes have always been of brighter shades than the others.

Science News Letter, February 13, 1937

METALLURGY

Beryllium-Copper Alloy Notable for Hardness

THE OLD and the new combine to make one of the newest alloys which metallurgists have developed. The result is a metal which is harder than the hardest bronze.

One of the first metals man used on his way up the scale of civilization was copper. And one of the newer metallic elements is beryllium, found in the mineral beryl, of which mineral emerald and aquamarine are common varieties. Beryllium is lighter than aluminum and so hard that it will scratch steel. Because of its wide use in experiments on nuclear bombardment its name is now better known than formerly.

Add about two per cent beryllium to copper and a ductile alloy is obtained. By heating and cold working, this alloy can be raised in tensile strength from its initial value of from 60,000 to 80,000 pounds to the square inch to over 170,000 pounds to the square inch.

Resistance to wear of the new alloy is said to be five times as great as phosphor bronze and its resistance to fatigue is exceeded only by a few steel alloys.

Its valuable properties give it increasingly wide use. High resilience and resistance to corrosion and fatigue make it desirable for coiled springs, flat springs and switch blades. Hardness and shock resistance make it useful for non-sparking handtools such as hammers, chisels and wrenches. Great resistance to wear makes it advantageous to use for bearings, gears, sliding contacts, handles of surgical instruments and wire cloth.

Science News Letter, February 13, 1937

PLANT PATHOLOGY

Disease-Resistant Tobaccos From South America

DISEASE-resistant varieties of tobacco have been brought back to the United States from northern South America by Raymond Stadelman of the U. S. Department of Agriculture, who searched for them on a 10,000-mile trip through Colombia, Venezuela, Peru and Ecuador. Plants raised from the 359 samples of seeds obtained by Mr. Stadelman will be crossed with cultivated tobaccos in an effort to obtain profitable strains for the market which will also be resistant to diseases.

Science News Letter, February 13, 1937

PSYCHOLOGY

"Relax!"

Psychologist Sees Value for Tight-Nerved Americans In Age-Old Methods Practiced in Far-Off India

By MARJORIE VAN DE WATER

"RELAX! Let yourself go!" These words of a popular song sum up the serious advice of a psychologist to the rushing man of business and his neurotic, high-strung wife.

It may seem a long step from the couch of the Hindu, practicing his religious art of semi-conscious contemplation of beauty, to the problems of the bustling American business man. But Dr. B. K. Bagchi, experimenting in the psychological laboratory of the State University of Iowa, has found that the Hindu method of relaxation has real value to the American who wishes to preserve his mental health and efficiency at its highest.

Relaxation Not Easy

Physicians give good general advice to their patients about relaxation, Dr. Bagchi says, but neither they nor their patients know very much about how to relax.

You can't relax just by throwing yourself down in an easy chair. You can never relax by rushing off on a hurried vacation trip. You may not be able to relax in a month spent at some sanitarium for a "rest cure."

It is all in knowing how, Dr. Bagchi says. Persons who know how to relax can, after ten minutes of such relief of tensions, experience a freshness like that which follows an hour or more of good sleep.

Not that it is so difficult to learn. Not at all! Children can, and should, be taught to relax, just as they are taught to walk and to run.

Practice the art of relaxation each day and you will build up your mental as well as your physical health, Dr. Bagchi promises.

"Busy people of this country need not fear the onset of national laziness as a result; the climate and their social and national inheritance will take care of that (*Mental Hygiene*).

"What will occur will be a toning down of their hypertensions, a relief from the evils that arise from it, and a stimulation of balanced activity."

Some East Indians, encouraged by the

warm climate and their background of tradition have overdone the business of relaxation, Dr. Bagchi admits.

"Relaxation should never replace action, but alternate with it," he explains. "This rhythm is paramount to our growth and adjustment. Those East Indians who are too much relaxed have not observed this rhythm and hence have suffered mentally, physically and in many other ways.

"The ideal of the most universally revered Indian book 'Gita' is action plus meditation. This ideal has always been followed by the best representatives of that country."

But if the Hindu need to be urged to greater action, the American on the contrary needs to be urged to let down and relax. The rushing, bustling American is just as capable of calm relaxation as is the placid Indian. If all races can go to sleep, they can all relax as well, Dr. Bagchi reasons but, as he says, it is a matter of knowing how.

First you must put yourself in the right mental "set" or attitude for relaxation. It won't do to go to bed on your expensive "beauty" mattress, close your eyes, and then go over and over all the problems of the day. While you are conjuring up ways to meet the mortgage, or planning a new campaign for the fall advertising, you are not relaxing. The first lesson in learning to relax is to learn how to set your mind at rest.

Listen to Quiet Music

You may begin by listening to a quiet piece of music, or by looking at a beautiful painting or landscape. Think of what you personally associate with relaxation—slow soft speech, limp hands, sleepy eyes, placid face. Gradually, you will feel yourself slipping into a restful mood. But do not stop there. That is not enough. You must go on and put the images out of your mind, retaining only the feeling of quiet that they induced.

But don't go to sleep while you are doing it. You may, and probably will, feel like drifting off. If you do doze off, when you come to, rub your eyes, and begin again. But try to stay awake.

This first step of relaxation should be practiced for 15-minute periods two or three times a day. And have the children try it, too.

Restlessness in children is natural and their activity should not be dammed up, Dr. Bagchi says, but they can and should be taught to be quiet at times, as well. Let them relax twice a day, and they may become less nervous. If they are inclined to stutter, this method may help them. Clinical work along this line is already going on in several places, Dr. Bagchi said.

This general attitude of relaxation must be followed or accompanied by the second step in the process—the specific relaxation of the muscles. For this you lie or sit comfortably and relax the various muscle groups of the body, one by one.

Smooth Out Those Wrinkles

You may begin with the muscles of your forehead. Smooth out those wrinkles and the tenseness between your eyes. Let your eyes relax. Then your cheeks, jaws, lips, tongue, inside muscles of the mouth and the throat, outside muscles of the throat, right and left shoulders, back, right hand, right arm, left hand, left arm, and so on through your body down to your right calf, left calf and your feet.

Some psychologists say that in order to thus relax your muscles you must first become aware of them by tensing them. First "do" each muscle group so as to feel it, then "not do" it more and more until you can completely let go. This is the method as taught by Dr. Edmund Jacobson at the University of Chicago. It differs somewhat from the East Indian method.

According to the Hindu system, you would not tense your muscle, but merely give it your attention. Then let it go. Abandon yourself to the relaxing act. You may not be able to keep this feeling of abandon more than a fraction of a second. But then repeat it.

Or, you may pay attention to the "feeling" of your incoming and outgoing breath, the rising and falling of your chest, or some other rhythmical perception. Then quietly slip into a state of "attenuated awareness." This is the almost sensationless and imageless state of quietness sought by the Hindu.

"To attain it is not as difficult as it sounds," says Dr. Bagchi. "This state



DR. B. K. BAGCHI

may not last more than a few minutes or even seconds. If it does not, do not make any 'fuss' about it mentally. You may be in and out of this for some time at each sitting, but be sure not to desire too hard nor to exert any great effort to be in it. If ideas or sensations appear, gently put them out of your mind; do not be disturbed if you fall short of consistent success.

"There will be times when you will feel the oncoming of sleep or when you will actually fall asleep. As you come to, open your eyes, move slightly, and begin again, but try to remain awake. This form of awareness and relaxation is remarkably restful and recuperative, and shows its overflow effect in the form of poise when one is active and busy."

Not the Same as Sleep

It is not the same thing as sleep. Physiologically, it is quite different. At his laboratory in the University of Iowa, Dr. Bagchi is studying the effect of prolonged relaxation of this type on the brain waves. Brain waves are those electric impulses directly from the brain that scientists have recently been able to "listen in" on and study. They have found that in sleep the rhythm of these impulses becomes very different from what it is during the waking hours.

When you have mastered these first two important steps of relaxation, Dr. Bagchi says you are ready to undertake the third. This is relaxation through quiet thinking.

"As a matter of daily practice or when you are tensed or overworked, sit or lie down in a comfortable place and read a book quietly, or with closed eyes go over a mildly interesting experience in a passive way. Think leisurely on what you read or on an inspiring picture, image for a few minutes a beautiful natural scene or ponder on a lofty abstract theme, on a sublime life, on a beautiful poem, a rippling brook, the gentle rustle of the woods, the echo of lonely wilds, the high mountain peaks, endless desert stretches, rolling green landscapes, and the like.

Think on What Interests

"Think quietly on what interests you," Dr. Bagchi advises. "But be sure that your thinking is more or less relevant."

This is what the Hindu calls meditation. It's good for you—but only to a certain extent, Dr. Bagchi warns.

"The habit of quiet introspection and thinking should be encouraged to a moderate extent in children as part of their mental hygiene, and also in adults, taking care, of course, that it is not overdone," he says. "Persons with too much of an introverted leaning should abstain from it entirely."

This warning against too much thinking recalls Shakespeare's famous plea voiced in "Julius Caesar":

"Let me have men about me that are fat
Sleek-headed men, and such as sleep
o' nights;

Yond Cassius has a lean and hungry
look;

He thinks too much: such men are
dangerous."

Don't Think Too Much

But, if not overdone, such quiet thinking, accompanied by pleasant feelings or emotions, has restful and beneficial results, Dr. Bagchi says. Scientists do not understand exactly why pleasantness should influence the body processes, but even the layman realizes the contribution that quiet pleasant music or light entertaining conversation makes toward the digestion of a good meal, for example.

So sit down and think over your vacation trip or your evening at the opera—but don't think too much.

And that brings us to the fourth and final step in this Hindu method of relaxation. Dr. Bagchi calls it "Relaxation through Uni-Directional Attention." You might call it concentration. In India it is combined with many different kinds of intricate practices such as breathing very rapidly to increase

the amount of oxygen in the system. To quote Dr. Bagchi:

"The Indian claim is that through the operating medium of pran (life energy) quiet attention can create astounding effects in the body. Unfortunately, much of this subject has fallen into the hands of charlatans or vulgarizers. The time has now come to check scientifically the major results that are supposed to follow from such practice and to determine whether or not there will be any general use for some aspects of it in the everyday life of the average man."

You are not to undertake this final step until you have gained a certain amount of mastery over the first two steps. Here are the directions in Dr. Bagchi's own words:

"As before, sit or lie down comfortably, seeing to it that no part of the body is tensed; be relaxed mentally—free your mind of worries or too many wish fancies. This time, with closed eyes, do not entertain many images, however pertinent to one relevant subject matter, but focus your attention quietly, without straining yourself, for a short time on one thought."

Concentrate on Small Thing

Concentrate on some small thing like the memory you have of a single musical note, a light, or a word such as "joy" or "dawn." You should not attempt to make the picture in your mind vivid, for vividness is not what is important according to this theory. Just attend to it without effort, and then let it go and cling to the feeling it has induced.

The difference between this advanced step and the second step is that now you are trying to achieve what Dr. Bagchi calls "attenuated awareness," by means of quiet attention. In the former step you were cultivating this quiet attention for its own sake.

"This attention should be quiet, not intense—just a steady flow of your mind, as it were," explains Dr. Bagchi. "It is like the flame of a candle undisturbed by wind, like the steady stream of oil pouring down from a higher into a lower jar. When you practice this method, do not build mental castles, or try to 'see' or 'hear' things. Nor should you try to 'suggest' anything to yourself. Such efforts are positively distracting."

If you can once master this art of losing yourself in concentration on a single thought, it will give you more than just the ability to seek rest when you are tense, Dr. Bagchi promises.

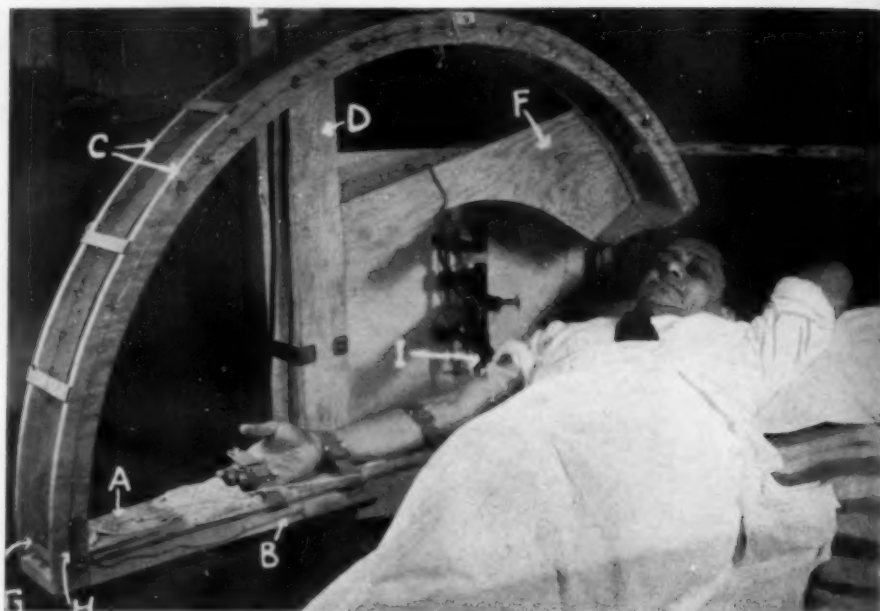
Quiet, forced attention can be used in every situation in life, he points out. Useless thoughts, movements, tensions can be dispensed with and the right of way offered to the problem in hand. Emotional upsets can be forestalled or their effect mitigated, not only by general relaxation, but by quiet attention to some definite task.

Relaxation need not be confined to your rest periods. It can be combined with action. If you are relaxed when you write, think, talk, walk, those activities will be better performed and they will tire you less than if you were tense.

People of this age spend more energy than is necessary, more than their systems will healthfully permit, Dr. Bagchi believes. Relaxation, he claims, will help to conserve this energy.

"Americans," he says, "want to relax, and will relax, not so much perhaps, for the sake of satisfying a religious need as for the sake of health, mental and physical, and for greater and better accomplishments in life."

Science News Letter, February 13, 1937



SCIENCE MEASURES TRADITION'S METHOD

Measuring the effect on the muscles of relaxation. With this apparatus, which measures speed of movement in thousandths of a second, Dr. Bagchi is studying the effect of relaxation on the electrical condition of the muscles.

PUBLIC HEALTH

New Food and Drug Bills Fail to Protect Public Fully

WEAKNESSES, from the medical viewpoint, in the two bills now pending in Congress dealing with foods, drugs and cosmetics are pointed out in the *Journal of the American Medical Association* (Feb. 6).

Each of the two bills is an improvement on last year's bills, the medical journal states, but the public needs still further protection, it holds.

A few of the points with which the medical profession takes issue are as follows:

1. The "free-for-all standards for official remedies." Each bill permits the drug manufacturers and dealers to fix their own private standards of strength for such drugs as are defined in the U.S. Pharmacopeia and the National Formulary.

The Senate bill goes even further, says the American Medical Association, and "permits similar tampering with established standards of quality and purity as well as with standards of potency."

2. Little protection to consumers of "patent" or proprietary medicines. Neither bill requires a manufacturer or dealer to name the ingredients on the

label, provided he has disclosed them fully and correctly to the Secretary of Agriculture.

"The obvious purpose of such legislation is to facilitate secrecy," says the *Journal*. "The fact that an invalid who resorts to self-medication and ought to know what he is taking is kept in the dark seems to have been regarded as immaterial."

The House bill, notwithstanding its exemption of formulas on labels, requires that the label must bear statements of the quantity, kind and proportion of alcohol.

"The phraseology leaves it extremely doubtful," says the medical journal, "whether barbituric acid, chloral, morphine or any other of the important group of narcotic and hypnotic drugs named in the bill, if it happens to be an active ingredient of any patent medicine, must be declared on the label."

3. No standards required of devices used in diagnosing, treating and preventing disease.

"Neither bill undertakes to lay down any standards of structural safety, of

accuracy or of potency for any such device. Provisions with respect to the misbranding of devices seem inadequate," the journal charges. "Devices are not required to be marked so as to show origin, purpose or manner of use."

4. Adulterants in cosmetics. A poisonous or harmful substance in a cosmetic is not considered an adulterant unless its presence renders the cosmetic injurious to users under the conditions of use as prescribed in labeling and advertisements, the journal declares. Makers and dealers in coal tar hair dyes are protected if they label the dyes with a "caution" wording.

The American Medical Association believes the two bills reach a happy solution of an old difficulty by having enforcement in the hands of the Secretary of Agriculture, outside of the field of unfair trade competition.

Science News Letter, February 13, 1937

● RADIO

Feb. 16, 5:15 p.m., E.S.T.

NEW NAMES FOR OLD PLACES—
S. W. Boggs, Department of State.

Feb. 23, 5:15 p.m., E.S.T.

WAKING FROM WINTER SLEEP—Dr.
Hartley Jackson of the U. S. Bureau of Biological Survey.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

GEOPHYSICS

Earth's Core Metallic Sponge, Suggests Fordham Seismologist

EARTH'S heavy core as a great metallic sponge filled with hydrogen gas is the latest picture of the mind of science to envision what the center of the earth is like. Rev. Joseph Lynch, noted seismologist of Fordham University, advances this new hypothesis.

The speed of transmission and the reflection and bending of earthquake waves, says Father Lynch, are about the only ways by which science can conjecture on the nature of the core of the earth deep below the outer solid crust.

With samples naturally unattainable, scientists must work backward in their deductions. They ask, points out Father Lynch, "what known conditions must the state of the earth's core satisfy?"

For one thing the earth has a density averaging about 5.5, or five and a half times as heavy as water per unit volume. But the density of the crust of the earth is only 4.2, so that the core requires something—liquid, solid or gas—whose density is close to the value 12. Iron, nickel and other heavy metals have previously been suggested to explain this high density, says Father Lynch.

But a study of the way earthquake waves travel through the earth shows evidence which demands other properties besides mere heaviness. Tidal phenomena require that the rigidity of the core be appreciably less than that of the crust on whose surface man builds cities that earthquakes occasionally destroy.

In addition the core must have the property of absorbing a special type of wave motion called shear waves, for it is observed that while compressional waves easily pass through the core, there are few known cases where the shear

waves come out, once they are inside.

Experiments in his laboratory, indicates Father Lynch, show that when the metal element palladium is packed, or occluded, with hydrogen gas to several times its own volume, its properties begin to approach those comparable with what is observed in the earth.

Father Lynch disclaims the idea that he believes the center of the earth to be made of palladium (its value is about \$18 an ounce). He merely used the rare metal as a convenient experimental sponge for "holding" the hydrogen.

The findings are suggestive, however, of the metallic sponge hypothesis on the nature of the earth's core. Experiments are now under way to study the effect of the absorbed hydrogen on the elastic properties of the material. When known these properties can be correlated with those observed in the earth and additional confirmation or rejection of the hypothesis will then be possible.

Science News Letter, February 13, 1937

BIOLOGY

Goes to Brazilian Tropics To Shock Electric Eels

WHAT happens to an electric eel when another electric eel hands it a dose of its own medicine?

This is one of the questions being taken to the Brazilian tropics by Dr. Richard T. Cox of the New York University physics department, who is leaving soon for an extended research visit in Para, Brazil, near the mouth of the Amazon, a favored haunt of the "shocking" elongate fish whose ability to generate and discharge paralyzing "jolts" of electricity is one of the classic riddles of biophysics.

Among the pieces of apparatus which Dr. Cox is taking with him is one calculated to deliver electrical discharges like those of the eel itself. His plan is to put his eel into contact with the device, "give it the works," and then make a careful scientific record of the fish's reaction.

Even more intimate studies of the electric eel's internal power plant and its workings are planned by Dr. Cox. He plans to block off various parts of

the eel's system of electric organs, either by sectioning nerves or with anesthetics, and thus to make analytic studies which have never been possible under aquarium conditions.

A prime part of Dr. Cox's research apparatus will be the cathode ray oscillograph, a relatively new instrument which has proved a most powerful tool in the hands of physicists and engineers studying the nature and rates of sudden electrical discharges. Modern apparatus of this kind has never been used in electric-eel studies, he says.

One reason why Dr. Cox is going to the tropics where the eels are, instead of having the eels brought to him, is that these peculiar fish do not survive the voyage north at all well, so that it is better economy for him to go where they are plentiful and where he can consequently afford to use up a few without constantly having to keep an anxious eye on a diminishing supply in a tank.

Dr. Cox will have with him his wife, Mrs. Shelby Shackelford Cox, as artist and general assistant, and a biologist, Robert S. Mathews, graduate student at Columbia University.

Science News Letter, February 13, 1937

TELEVISION A Guide for the Amateur

By S. A. Moseley and H. McKay

TELEVISION is a subject of the greatest general interest today. It will be one of the great sources of public entertainment tomorrow. Just as radio, a few years ago, emerged from the scientist's laboratory to be the object of enthusiastic investigation by the amateur, so television is now emerging. Although regular broadcasts are now being made in New York and London, many difficulties are still being worked out, and amateurs, provided with the groundwork, can help.

Television, by Moseley and McKay, provides this groundwork. With an excellent glossary of television terms and many illuminating illustrations, it brings you up to date on the history of this fascinating subject, the most recent developments and most modern equipment, and the possibilities of the future.

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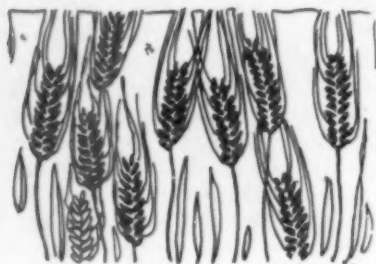
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Stones Into Bread

SOIL erosion just now is the chief ogre of conservation-minded America. We hear with justifiable dismay of the inroads wind and water have been making upon our best farming, pasture, and forest lands. We spend millions of dollars and endless efforts of scientific brain and CCC brawn to check a process that has become a menacing waste of our national resources.

Yet erosion is a menace mainly in so far as man himself has made it so. Unwise stripping of forests off the hills, exposure of rangelands to the greedy denuding mouths of too many cattle and sheep, plowing and clean cultivating of slopes that should rightly be left in grass or at any rate terraced: these are our own sins, and nature is only imposing impartial penalty upon us for them.

Erosion in nature's own economy is for the most part a beneficent process, even when looked at through man's egocentric eyes. If there had been no erosion since the beginning of the world, there would be no soil for forests and

crops to grow in, no river valleys and pleasant lakes to supply fresh water and comfortable dwelling-places, not even any sand in which to play on the seashore.

Erosion is the natural complex of effects of wind and water, frost and summer heat, upthrust and gravity, on the massive lavas and jagged rocks that were the earth's only original endowment. Atmosphere inevitably brings about erosion. If you would see an erosionless world, look upon the atmosphereless moon. There have been no floods there, no washed soil, no dust storms for untold ages. Probably there never was any erosion on the moon at all. Yet if interplanetary transportation were available, it is extremely unlikely that there would be any emigration whatever to the moon, even from the most

erosion-scored lands of all the earth.

Life itself, even when lived less prodigally than man seems to know how to live it, is an agency of erosion, and benefits the plants and animals that take part in the process. Lichens growing on a bare rock, for example, initiate erosion. They secrete substances that dissolve a little of the rock face away and make a shallow foothold for these lowly plants. Then dust and debris gather, mosses come in, soil acids may eat a little deeper into the rock. Into crevices creeps water, freezing and thawing, and wedging fragments out. Slowly the once-forbidding hard rock pulverizes into soil.

Truly, the mills of God grind slowly, but they grind exceeding small. Through erosion, stones become bread.

Science News Letter, February 13, 1937

MEDICINE

Man-Made Radioactive Sodium Used to Treat Human Disease

FOR the first time a man-made radioactive substance is treating disease.

This became known when injection of radiosodium, an element totally uncreated a few years ago, into two human sufferers from leukemia was reported by Drs. Joseph G. Hamilton and Robert S. Stone of the University of California Medical School.

The clinical value of the radium-like treatments was pronounced inconclusive, but these experiments are expected to pave the way for further tests upon this disease and also cancer, which leukemia is like in some respects.

The radiosodium used was made by the bombardment of sodium chloride

(common table salt) with hearts of heavy hydrogen (deuterons) shot out by the powerful cyclotron or atomic "merry-go-round" devised by Prof. Ernest O. Lawrence in the University of California physics laboratory.

Radiosodium was seized upon for medical use because it promises to have the beneficial effects of radium and other natural radioactive substances without their dangers. Radium and its salts if injected into the human body become fixed in the body tissues and continue to bombard them until death is caused, usually in a few years. This is not possible with radiosodium as its activity is over in a few hours instead of continuing for many years. The half-life of radiosodium is only 14.8 hours. This short duration of radiosodium's activity made necessary speedy teamwork between the physicians and the physicists in the leukemia experiments just reported. Sodium chloride was bombarded, rushed to the hospital, dissolved in water, boiled, filtered, tested for activity, and then injected into the veins of the patients, who were men 29 and 23 years old.

It is expected that other artificially created radioactive substances will be used experimentally in disease treatment in the near future.

Science News Letter, February 13, 1937

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Additional Reviews
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Social Sciences—Periodicals

THE PUBLIC OPINION QUARTERLY, vol. 1, no. 1, Jan., 1937—*School of Public Affairs, Princeton University*, \$1 single copy, \$4 yearly. Since this new journal is aimed primarily at problems in the social sciences, it is inevitable that its field should overlap into that of the physical sciences at many points. Psychologists working toward a real science of group or mass psychology will find this publication particularly interesting.

Science News Letter, February 13, 1937

Mathematics

THERE IS FUN IN GEOMETRY—Louis Kasper—*Fortuny's*, 135 p., \$1.75. Three motives combine to bring value to this book. Mechanics are shown how to solve some of the problems which they encounter in their trade; students are provided with interesting and practical examples to liven an all too often "dead" course; and finally those people who enjoy mathematical puzzles will here find a new treasure storehouse.

Science News Letter, February 13, 1937

Safety Engineering

MAN AND THE MOTOR CAR—Ed. by Albert W. Whitney—*National Bureau of Casualty and Surety Underwriters*, 256 p., \$1. With the knowledge that the surest way to reduce the annual traffic death toll in the nation is to improve the quality of the drivers, an official of the Public Safety Council has arranged this book which tells all the tricks and twists of safe driving.

Science News Letter, February 13, 1937

Physics

OLD WIRES AND NEW WAVES; THE HISTORY OF THE TELEGRAPH, TELEPHONE, AND WIRELESS—Alvin F. Harlow—*Appleton-Century*, 548 p., illus., \$5. Few people who pick up the telephone, send a telegram or turn on the radio set realize the exciting, fascinating history of these three great inventions. From a great amount of original research, and with cooperation which opened material usually carefully hidden, the author has contributed an extremely worthy book to the field.

Science News Letter, February 13, 1937

Radio

OFFICIAL RADIO SERVICE HANDBOOK—J. T. Bernsley—*Gernsback*, 1008 p., \$4. A good book on radio repairing for service men who wish to catch up on the

new developments and the background of theory and practice in order to speed up their operations. The word official in the title of the book is only that—a title—for the volume is an independent effort not sponsored by any recognized radio organization.

Science News Letter, February 13, 1937

Technology

ELEMENTARY PRINCIPLES OF DIESEL-ENGINE CONSTRUCTION—Thomas G. Brown and F. W. Ziegenhagen—*Bruce*, 125 p., illus., \$1.80. An elementary text for use by high school students.

Science News Letter, February 13, 1937

Physics

DESCRIPTIVE PHYSICS—Sherman R. Wilson—*Holt*, 231 p., illus., \$1.20. A high school survey text in physics which attempts to take away some of physics' reputation of being a difficult course. A book which, rather than attempting to provide all the knowledge which one might like for a college course, strives, with considerable success, to tell the story of the applications of physics in a way which holds the student's interest.

Science News Letter, February 13, 1937

Physics

CATHODE RAY OSCILLOGRAPHY; Vol. II—J. T. MacGregor-Morris and J. A. Henley—*Instruments Pub. Co.*, 249 p., \$6. A British book on the applied uses in electrical engineering of the cathode ray oscillograph which until very recently was regarded mainly as a research tool of university experimenters.

Science News Letter, February 13, 1937

Engineering

THE STORY OF BRIDGES—Archibald Black—*Whittlesey House*, 226 p., plates, \$2.50. The fascinating illustrated story of bridges, from the first fallen tree across a small stream to the modern giants, is simply told in a really worthwhile book for the layman.

Science News Letter, February 13, 1937

Physics

LA THÉORIE DE L'ION AMPHOTÈRE—P. Rumpf—*Hermann & Cie, Paris*, 51 p., 12fr.

Science News Letter, February 13, 1937

Physics

L'EFFET ZEEMAN DANS LES SPECTRES DE BANDES—René Fortrat—*Hermann & Cie, Paris*, 40 p., illus., 12fr.

Science News Letter, February 13, 1937

Archaeology

NEW LIGHT ON HEBREW ORIGINS—J. Garrow Duncan—*Macmillan*, 282 p., \$2. Very readable and up to date is this small volume which interprets early Old Testament chapters in the light of archaeological discovery. Such Biblical puzzles as the reference to iron being used by the early people in Genesis are straightened out by evidence from the earth. Dr. Duncan takes up a great number of such points, and his book shows how Egypt, Babylonia, and Canaan made contributions to the Hebrew culture.

Science News Letter, February 13, 1937

Anthropology

ART AND LIFE IN NEW GUINEA—Raymond Firth—*Studio Publications*, 126 p., plates, \$3.50. Beautiful illustrations are the feature of this artistic book. The author makes it plain that his book "has been composed primarily for the intelligent layman interested in art, and not for the anthropological specialist." His pictures, and explanations of the art and the people who make it, should fulfill their mission of teaching appreciation of a primitive art.

Science News Letter, February 13, 1937

Anthropology

CONTRIBUTIONS TO THE ETHNOLOGY OF THE KUTCHIN—Cornelius Osgood—*Yale Univ. Press*, 189 p., 10 plates, \$2.50. A study of Athapaskan-speaking Indians in the Yukon and Mackenzie region. The material is presented to build a picture of aboriginal Kutchin customs just before European influence and to show changes that have since developed.

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PSYCHOLOGY OF SEX
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Additional Reviews
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Medicine

INTO THIS UNIVERSE, THE STORY OF HUMAN BIRTH—Alan Frank Guttmacher—*Viking*, 366 p., \$2.75. Dr. Guttmacher seems to know all the questions a layman can ask about the process of childbirth and he has a happy faculty of giving the answers in most readable, entertaining style. In this book, historic as well as modern methods of childbirth are described in simple, non-technical language.

Science News Letter, February 13, 1937

Physiology—Health

KEEPING YOUR CHILD NORMAL—Bernard Sachs—*Hoeber*, 148 p., \$1.50. Published ten years ago under the title, *The Normal Child*, this book appears in new form and with some new material. There are still, fortunately, plenty of normal children and their parents will be glad to have this sane and sound volume which proved itself useful to an earlier generation of parents.

Science News Letter, February 13, 1937

Public Health

RURAL HEALTH PRACTICE—Harry S. Mustard—*Commonwealth Fund*, 603 p., \$4. Dr. Mustard knows from long experience what the health officer and his assistants in rural communities and small cities need to know. In this book he manages to give information and advice that is both comprehensive and specific. The book has the added advantage of being very readable, and it should prove useful. Not intended, of course, for lay reading.

Science News Letter, February 13, 1937

Pharmacy

THE PHARMACEUTICAL RECIPE BOOK (2nd ed.)—*American Pharmaceutical Assn.*, 529 p., \$5 buckram, \$6 flexible leather. This volume provides practicing pharmacists with a useful supplement to the National Formulary and U. S. Pharmacopoeia.

Science News Letter, February 13, 1937

Chemistry

THE FREEZING PRESERVATION OF FRUITS, FRUIT JUICES, AND VEGETABLES—Donald K. Tressler and Clifford F. Evers—*Avi*, 369 p., illus., \$5. Although the freezing method has been used in the vegetable and fruit industries for a number of years, a comprehensive handbook, usable alike by those already engaged in the industry and as a text for the instruction of

students preparing for it, has heretofore been lacking. This need is now well supplied. One very useful feature of this book is the full list of literature references appended to each chapter.

Science News Letter, February 13, 1937

Chemistry

THE DRAMA OF CHEMISTRY; HOW MAN DEALS WITH ATOMS—Sidney J. French—*University Society*, 170 p., illus., \$1. Prof. French chooses the atom as the leading actor in his drama of chemistry and the brief, popularly written story is a fascinating one. Pictures of all the major leaders in chemistry, past and present, add interest; and a sizable glossary of terms at the end solves the problem of maintaining continuity in the text without divergent writing to explain some of the more complex terms.

Science News Letter, February 13, 1937

Medicine

THE DEVELOPMENT OF MODERN MEDICINE, AN INTERPRETATION OF THE SOCIAL AND SCIENTIFIC FACTORS INVOLVED—Richard Harrison Shryock—*Univ. of Pennsylvania*, 442 p., illus., \$4. Here is medical history written by a historian instead of a physician. The result is a book which does not dramatize the conquest of disease but instead shows the relation between the development of medicine and the development of public health and our modern social order.

Science News Letter, February 13, 1937

Physiology

THE PHYSIOLOGY AND PHARMACOLOGY OF THE PITUITARY BODY—H. B. Van Dyke—*Univ. of Chicago*, 577 p., illus., \$4.50. Scientists will welcome this monograph which brings into one volume a critical summary of the tremendous amount of research done on the pituitary gland during the past fifteen years. It is too technical for lay reading.

Science News Letter, February 13, 1937

Geology

STRUCTURAL EVOLUTION OF SOUTHERN CALIFORNIA—R. D. Reed and J. S. Hollister—*Amer. Assn. Petroleum Geologists*, 157 p., folded map, \$2. Structural-historical geology of one of the more important oil-field regions of the United States, done primarily from the oil man's point of view, yet with so broad a viewpoint that it cannot fail to be of interest to geologists in general.

Science News Letter, February 13, 1937

Physics

AN INTRODUCTION TO NUCLEAR PHYSICS—N. Feather—*Cambridge (Macmillan)*, 213 p., \$3. One of Cambridge University's best known experimentalists on the bombardment of the atomic nucleus here summarizes the intensive attempt by scientists throughout the world to wrest the secrets that are bound up within the hearts of atoms. Dr. Feather chooses his material from all sources and is generous with credit to American investigators.

Science News Letter, February 13, 1937

Engineering

THERMODYNAMICS, A PRACTICAL TEXT COVERING THE FUNDAMENTALS OF THERMODYNAMICS THAT ARE BASIC TO THE ENGINEERING FIELD—Stanton E. Winston—*American Technical Society*, 178 p., illus., \$1.50. A compact text for engineers with problems which have real significance in the applied field.

Science News Letter, February 13, 1937

General Science

A PHILOSOPHY OF SCIENCE—Philip Eichler—*Putnam's*, 111 p., \$1.50. A New York physician develops the subject with treatment of the physical, biologic and psychologic aspects, laying emphasis upon his idea that psychological knowledge is necessary to understand motion.

Science News Letter, February 13, 1937

General Science

REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION AND FINANCIAL REPORT OF THE EXECUTIVE COMMITTEE OF THE BOARD OF REGENTS FOR THE YEAR ENDED JUNE 30, 1936—*Smithsonian Institution—Govt. Print. Off.*, 107 p. Free upon direct application to Smithsonian Institution, Washington, D. C.

Science News Letter, February 13, 1937

Education

RETROSPECT AND FORECAST IN RADIO EDUCATION—Levering Tyson and William J. Donovan—*Univ. of Chicago*, 28 p., 25c.

Science News Letter, February 13, 1937

Archaeology

ARCHAEOLOGICAL SURVEY OF THE GUANO VALLEY REGION IN SOUTHEASTERN OREGON—L. S. Cressman—*University of Oregon*, 48 p., 50c.

Science News Letter, February 13, 1937